动 物 学 研 究 2011, Oct. 32(5): 566−571 CN 53-1040/Q ISSN 0254-5853
Zoological Research DOI: 10.3724/SP.J.1141.2011.05566

A new blind loach species, *Triplophysa huanjiangensis* (Teleostei: Balitoridae), from Guangxi, China

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Abstract: A new blind loach of the genus *Triplophysa* was collected in 2007 from a cave in Leyi village, located near Chuanshan Town, Huangjiang County in the Guangxi Zhuang Autonomous Region of southern China. The new species, *Triplophysa huangjiangensis* sp. nov, can be distinguished from its congeners by eyes and scales absent; caudal-fin forked; adipose keel present; lips with furrows; distal margin of dorsal-fin truncate, dorsal fin origin much closer to caudal-fin base than snout tip; 8–9 branched dorsal-fin rays; 6–7 branched pelvic-fin rays; 6 branched anal-fin rays; 10–11 branched pectoral-fin rays; 13–14 branched caudal-fin rays; pectoral-fin length 52.3%–70.7% the distance between pectoral-fin origin to pelvic-fin origin; dorsal-fin origin posterior to vertical line of pelvic-fin origin; outer rostral barbel longer than other two pairs of barbels, with 47.0%–73.8% of lateral head length; anterior nostril with elongate barbel-like tip; and posterior chamber of gas-bladder developed, reaching pelvic-fin origin.

Key words: New species; Blind fish; Balitoridae; *Triplophysa*; Guangxi

中国广西盲鳅一新种——环江高原鳅

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摘要: 2007 年 4 月, 在广西壮族自治区环江县川山镇乐衣村附近一洞穴采集到一批盲鳅类标本。经鉴定, 为高原鳅属（*Triplophysa*）鱼类一新种, 被命名为环江高原鳅（*Triplophysa huangjiangensis*）。该新种以以下组合特征与高原鳅属的其他已知种类相区别: 无眼; 通体无鳞; 尾鳍分叉; 尾柄上、下叶具发达的软鳍褶; 背鳍后缘平截; 背鳍起点距尾鳍基的距离短于距吻端的距离; 背鳍分枝鳍条数为 8~9; 胸鳍分枝鳍条数为 10~11; 腹鳍分枝鳍条数为 6~7; 臀鳍分枝鳍条数为 6; 尾鳍分枝数为 13~14; 胸鳍长为胸鳍起点至腹鳍起点间距的 52.3%~70.7 %; 腹鳍起点位于背鳍起点之前下方; 外侧吻须最长, 为侧面头长的 47.0%~73.8 %; 前鼻孔位于一短管中, 末端延长呈须状; 鳔后室发达, 末端可伸达腹鳍起点。

关键词: 新种; 盲鱼; 爬鳅科; 高原鳅属; 广西
中图分类号: Q959.468 **文献标志码**: A **文章编号**: 0254-5853-(2011)05-0566-06

The genus *Triplophysa* Rendahl 1933 is currently placed in the family Balitoridae, subfamily Nemacheilinae (Nelson, 2006). *Triplophysa* can be distinguished from other nemacheiline genera by possessing close together nostrils, a posterior wall of the bony capsule of the swim bladder, specific sexual dimorphism in which males have tubercle-bearing, elevated skin on both sides of the head, and a thickened tuberculated pad or agglomerations on the dorsal surfaces of the broadened and widened pectoral-fin rays (He et al, 2008; Zheng et al, 2009; Prokofiev, 2010).

Worldwide there are 121 nominal species in the *Triplophysa* genus, of which, 105 have been recorded in China (Froese & Pauly, 2011; He et al, 2011). Fourteen

Received date: 2011-06-08; Accepted date: 2011-07-08
Foundation items: This work was supported by Systematic and Conservation Studies on Cave Fishes in Guangxi (2060302)
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收稿日期：2011-06-08；接受日期：2011-07-08

cavefish species from the genus *Triplophysa* have been recorded in south-west China (Li et al, 2008; Romero et al, 2009; Zheng et al, 2009). Of these, eye vestigial species include *T. rosa* (Chen & Yang, 2005), *T. tianeensis* (Chen et al, 2004), *T. aluensis* (Li & Zhu, 2000), and *T. qiubeiensis* (Li et al, 2008), while eye absent species include *T. gejiuensis* (Chu & Chen, 1979), *T. longibarbatus* (Chen et al, 1998), *T. shilinensis* (Chen et al, 1992), and *T. xiangxiensis* (Yang et al, 1986). In April 2007, several specimens of a blind loach were collected from a cave in Leyi village, Chuanshan Town, Huanjiang County, Guangxi Zhuang Autonomous Region of southern China. Subsequent examination showed that these specimens should be recognized as a new species belonging to the genus *Triplophysa*.

1 Materials and Methods

Counts and most measurements followed Kottelat (1990), except for the following: length of median caudal ray was the length of the shortest branched caudal-fin ray; caudal-peduncle depth was measured at the posterior anal-fin base, including the dorsal crest (adipose keel); minimum caudal-peduncle depth excluded the depths of the dorsal and ventral crests; and dorsal and ventral crests were defined as the maximum depth of each crest. Measurements were taken with digital calipers and recorded to 0.1 mm. Abbreviations used in this study include SL for standard length, HL for lateral head length, DPV for distance between pectoral-fin origin to pelvic-fin origin, CPD for caudal-peduncle depth, and CPL for caudal-peduncle length. Data comparing characters for blind and scaleless *Triplophysa* species were obtained from the original descriptions and Chen et al (2004). Materials examined in this study were deposited in the collections of the Guangxi Institute of Fisheries (GIF) and the Guangxi Teachers Education University (GTEU).

2 Results

2.1 *Triplophysa huanjiangensis* sp. nov. (Fig. 1; Tab. 1)

Holotype: GIF 07040316, 90.0 mm SL, Huanjiang County, Guangxi Zhuang Autonomous Region, China, April 2007, N25°06′2.6″, E108°00′01″; collected by LAN Jiahu.

Paratypes: GIF 07040314, GIF 07040319, GTEU 07040308 and GTEU 07040311, four specimens, 48.9–124.2 mm SL, collected with the holotype.

2.1.1 Diagnosis *Triplophysa huanjiangensis* can be distinguished from its congers by the following characteristics: eyes and scales absent; caudal-fin forked; adipose keel present; lips with furrows; distal margin of dorsal-fin truncate, dorsal fin origin much closer to caudal-fin base than snout tip; 8–9 branched dorsal-fin rays; 6–7 branched pelvic-fin rays; 6 branched anal-fin rays; 10–11 branched pectoral-fin rays; 13–14 branched caudal-fin rays; pectoral-fin length 52.3%–70.7% the distance between pectoral-fin origin to pelvic-fin origin; dorsal-fin origin posterior to vertical line of pelvic-fin origin; outer rostral barbel longer than other two barbel pairs, with 47.0%–73.8% of lateral head length; anterior nostril with elongate barbel-like tip; and posterior chamber of gas-bladder developed, reaching pelvic-fin origin.

Fig. 1 Lateral view of *Triplophysa huanjiangensis* sp. nov. Holotype, GIF 07040316, 90.0 mm SL, Leyi village, Chuanshan Town, Nandan County, Guangxi Zhuang Autonomous Region, China

2.1.2 Description Lateral view of *T. huangjiangensis* is provided in Fig. 1. Morphometric data of type specimens of *Triplophysa huanjiangensis* sp. nov are given in Tab. 1. Dorsal-fin with ii, 8–9; anal-fin with ii, 6 rays; pectoral-fin with i, 9–11 rays; pelvic-fin with i, 6 and caudal-fin with 13–14 branched rays.

Body elongate, slightly compressed anterior and more laterally compressed posterior. Head depressed, long, maximum head width shorter than head depth; lateral head length greater than body depth. Snout slightly pointed. Both anterior and posterior nostrils closely situated, anterior ones in short tube with elongated barbels. No eyes. Orbital cavity slightly sunken. Mouth inferior, mouth gape arched. Posterior margin of mouth anterior to vertical line of posterior nostrils. Lips furrow, lower lip interrupted in the middle with a median notch (Fig. 2). Upper jaw arched. Lower jaw spoon-like with obtuse edge. Three pairs of barbels; inner rostral barbels extending to posterior margin of nostrils; the longest, outer rostral barbels extending beyond anterior margin of operculum; maxillary barbels

Tab. 1 Proportional measurements of *Triplophysa huanjiangensis* sp. nov. and *T. longibarbatus*

	Holotype	Paratypes				Range	*Mean*	*T. longibarbatus*
Catalogue number	GIF 07040316	GTEU 07040308	GTEU 07040311	GIF 07040314	GIF 07040319			
Standard length (mm)	90.0	48.9	124.2	86.0	112.9	48.9–124.2	92.4	
Lateral head length (mm)	20.6	10.6	27.0	18.0	24.7	10.6–27.0	20.2	
Percentage (%) of SL								
Body depth	15.7	12.5	14.0	12.7	13.2	12.5–15.7	13.6	10.1–20.1
Dorsal head length	20.6	18.6	17.8	17.5	18.8	17.5–20.6	18.7	21.4–27.6*
Lateral head length	22.9	21.7	21.8	21.0	21.9	21.0–22.9	21.8	25.5–29.0*
Prepelvic length	55.8	50.9	54.5	50.0	56.8	50.0–56.8	53.6	49.9–69.2
Preanal length	74.3	72.8	76.1	73.1	77.5	72.8–77.5	74.7	45.2–76.1
Preanus length	69.6	67.3	70.5	67.4	70.5	67.3–70.5	69.0	67.7–73.1
Caudal-peduncle length	18.7	18.8	17.1	18.5	17.2	17.1–18.8	18.1	12.3–16.7*
Caudal-peduncle depth	9.1	8.1	7.7	7.4	7.8	7.4–9.1	8.0	4.3–6.8*
Maximum head width	11.1	9.7	10.1	9.0	9.7	9.0–11.1	9.9	
Height of dorsal fin	13.6	13.8	10.3	12.8	13.1	10.3–13.8	12.7	14.7–19.6*
Pectoral-fin length	23.3	20.3	19.5	19.6	18.3	18.3–23.3	20.2	20.0–26.6
Pelvic-fin length	14.2	13.8	13.2	13.8	14.6	13.2–14.6	13.9	14.2–19.0
Anal-fin length	14.9	15.7	13.3	16.8	14.9	13.3–16.8	15.1	15.0–19.1
Length of upper caudal lobe	18.5	20.9	15.3	17.2	17.6	15.3–20.9	17.9	17.6–33.5
Length of median caudal ray	12.9	10.7	10.6	12.5	12.4	10.6–12.9	11.8	
Percentage (%) of HL								
Inner rostral barbel length	32.2	19.8	20.1	29.1	24.4	19.8–32.2	25.1	
Outer rostral barbel length	62.9	51.3	53.2	73.8	47.0	47.0–73.8	57.6	
Maxillary barbel length	52.9	30.6	36.7	43.7	32.9	30.6–52.9	39.4	
Maximum head depth	40.3	42.4	41.2	36.6	38.2	36.6–42.4	39.7	47.3–57.6
Maximum head width	48.6	44.8	46.4	42.8	44.3	42.8–48.6	45.4	
Pectoral-fin length/DPV	70.7	64.8	55.6	62.9	52.3	52.3–70.9	61.3	
CPD/CPL	48.7	43.1	45.0	40.1	45.2	40.1–48.7	44.4	
Dorsal crest/Minimum CPD	98.2	89.3	72.9	76.0	65.0	65.0–98.2	80.3	
Ventral crest/Minimum CPD	56.7	54.0	47.3	48.5	54.5	47.3–56.7	52.2	

Data of *T. longibarbatus* are from Du et al, 2008; asterisk (*) indicated the distinctions between *Triplophysa huanjiangensis* and *T. longibarbatus*.

can extend beyond anterior margin of operculum, but do not reach tip of the outer rostral barbels. Gill membranes united with isthmus.

Dorsal-fin origin nearer caudal-fin base than snout tip; edge of dorsal-fin truncate; height of dorsal-fin shorter than lateral head length. Pectoral fin length more than half the distance between the pectoral-fin origin to pelvic-fin origin; the longest pectoral-fin ray in the first branched ray is more than two times of length of the last branched pectoral-fin ray. Pelvic-fin origin anterior to the vertical line of the dorsal-fin origin. Anus situated posterior to anal-fin origin. Anal fin short, truncate. Caudal peduncle long with adipose keels, caudal-peduncle depth is less than half of the caudal-peduncle length; dorsal crest is more developed than the ventral crest. Caudal fin forked, tips slightly arched.

Body without scales. Lateral line absent. Intestine short with two coils. Stomach enlarged, two times wider than intestine. Bony capsule of air-bladder dumbbell-shaped; posterior chamber of air-bladder developed, tip of posterior chamber reaches beyond pelvic-fin origin. One specimen (GTEU 07040311), female, 124.2 mm SL, eggs in stage III development observed.

2.1.3 Color In fresh condition, ground color of body light pink, fins transparent; dorsal of head and dorsal of body covered with pigments, light grey (Fig. 3A). One specim en, more pigments present on body sides and head, fins transparent (Fig. 3B). After fixed in 10%

Fig. 2 Head ventral view of *Triplophysa huanjiangensis* sp. nov. Holotype, GIF 07040316, 90.0 mm SL, Leyi village, Chuanshan Town, Nandan County, Guangxi Zhuang Autonomous Region, China

formalin,body whitish; pigments on body same as in fresh condition.

2.1.4 Distribution Known from a karst cave in Leyi village (N25°06′2.6″, E108°00′01″), Chuanshan Town, Nandan Cou nty, Guangxi Zhuang Autonomous Region, China (Fig. 4).

2.1.5 Etymology The specific epithet is named after the Chinese name “Huanjiang”, the county where the type specimens were collected.

Fig. 3 Living status of *Triplophysa huanjiangensis* sp. nov

3 Discussion

Triplophysa huanjiangensis, *T. gejiuensis*, *T. longibarbatus*, *T. shilinensis*, and *T. xiangxiensis* are distinguished from the remaining species of *Triplophysa* by their eyeless state. Comparisons of characteristics for blind and scaleless *Triplophysa* species are given in Tab. 2. *Triplophysa xiangxiensis* can be distinguished from other blind *Triplophysa* species by a highly developed pectoral fin, reaching beyond pelvic-fin origin, and caudal fin with 16 branched rays. *Triplophysa huanjiangensis* can be distinguished from *T. gejiuensis*

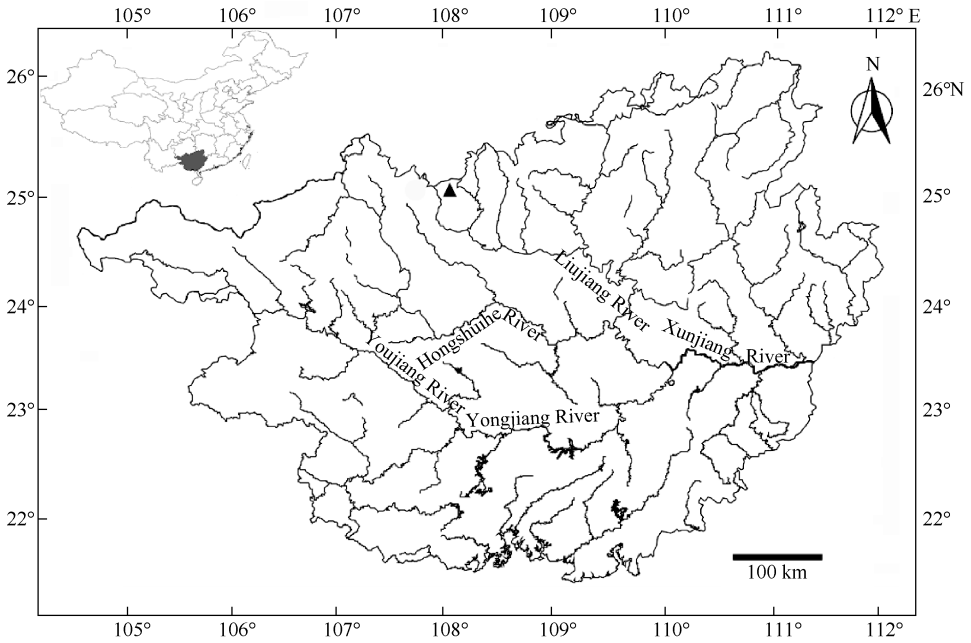

Fig. 4 Collection site of *Triplophysa huanjiangensis* sp. nov. (▲) in Guangxi Zhuang Autonomous Region, China

Tab. 2 Comparison of characters for blind and scaleless *Triplophysa* species

	T. huanjiangensis	*T. gejiuensis*	*T. shilinensis*	*T. longibarbatus*	*T. xiangxiensis*	*"T." maolanensis*	*"T." posterodarsalus*
Dorsal fin rays	ii, 8–9	iii, 7−8	iii, 7	ii, 8	iii, 8	iii, 8	iii, 6
Anal fin rays	ii, 6	iii, 4−7	iii, 5	ii, 6	iii, 6	ii, 5	ii, 4
Pectoral fin rays	i, 10–11	i, 9–11	i, 8–10	i, 10–11	i, 11	i, 11	i, 13
Pelvic fin rays	i, 6	i, 6	i, 6	i, 5–6	i, 6	i, 6	i, 5
Branched caudal-fin rays	13–14	14–15	14	13–14	16	14	15
Distal margin of dorsal-fin	Truncate	Truncate	Truncate	Truncate	–	–	–
Tip of pectoral-fin reaching pelvic-fin origin	No	No	No	Yes	Yes	No	No
Caudal fin	Forked	Forked	Deeply Forked	Forked	Forked	Forked	Deeply Forked
Dorsal fin position	Closer to caudal fin base	Closer to caudal fin base	Closer to caudal fin base	Closer to caudal fin base	Closer to snout	Closer to caudal fin base	Closer to caudal fin base
Pelvic fin position	Anterior to dorsal-fin origin	Posterior to dorsal-fin origin	posterior to or above dorsal-fin origin	Posterior to or above dorsal-fin origin	Posterior to dorsal-fin origin	above dorsal-fin origin	Anterior to dorsal-fin origin
Anus close to anal fin	No	Yes	No	No	Yes	–	No
Anterior nostril barbel-like elongated	Yes	No	Yes	Yes	No	No	Yes
Adipose keel present	Yes	No	No	Yes	Yes	Yes	Yes

and *T. shilinensis* by the pelvic fin being anterior to the dorsal-fin origin (vs. pelvic fin posterior to or above dorsal-fin origin), and the presence of adipose keel (vs. adipose keel absent). *Triplophysa huanjiangensis* is most similar to *T. longibarbatus* (Fig. 5) by number of each fin rays, presence of adipose keel and anterior nostril barbel-like elongated, and by their neighboring locations. However, *T. huanjiangensis* can be distinguished from *T. longibarbatus* by the following characteristics: tip of pectoral-fin cannot reach pelvic-fin origin (vs. tip of pectoral-fin reaching pelvic-fin origin), pelvic fin anterior to dorsal-fin origin (vs. posterior to or above dorsal-fin origin) and some proportional characters (Tab. 1).

Fig. 5 Triplophysa longibarbatus, 10060203, 65.9 mm SL, Laoye Cave, Dongtang Town, Libo County, Guizhou, China; collected by LAN Jia-Hu

Two blind *Paracobitis* species have been recorded in recent years, *Paracobitis posterodorsalis* and *P. maolanensis* (Li et al, 2006; Ran et al, 2006). Romero et al (2009) stated that *Paracobitis maolanensis* was probably a species of *Triplophysa* but distinct from *T. longibarbatus*, although further studies are needed to determine its systematic status. *Paracobitis posterodorsalis* has been considered a possible junior synonym of *Triplophysa longibarbatus* (Romero et al, 2009). Hu & Zhang (2010) indicated that it is difficult to comment on the generic status of these species as type specimens for "*Paracobitis*" *posterodorsalis* and "*P.*" *maolanensis* are inaccessible. Currently, however, Hu & Zhang (2010) have excluded the two species from *Homatula* (senior synonymous generic name of Chinese *Paracobitis* species). Although we also did not examine the type specimens of *Paracobitis posterodorsalis* and *P. maolanensis* in the present study, we did obtain pictures of the two species and tentatively treated them as *Triplophysa* species. Based on the original description and picture of "*T.*" *posterodorsalis*, *Triplophysa huanjiangensis* can be distinguished from *T. posterodorsalis* by depressed and elongated head (vs. cylinder-shaped), dorsal fin rays ii, 8–9 (vs. iii, 6), anal fin rays ii, 6 (vs. ii, 4) (Tab. 2), and pelvic-fin origin slightly anterior to dorsal-fin origin (vs. pelvic-fin obviously anterior to dorsal-fin origin). *Triplophysa huanjiangensis* can be further distinguished from "*T.*" *maolanensis* by nostril barbel present (vs. absent), length of median caudal ray 61.7–69.3% the length of the upper caudal lobe (vs. 45.5%), and lateral head length 21.0–22.9% SL (vs. 30.4%).

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